

# Technologies

FOR SUSTAINABLE FOOD PRODUCTION IN THE BALTIC SEA REGION

## Cover photo

Participants in BalticCOMPASS Work Package 4 coordination meeting 8-9 March 2012 at the Lithuanian Agricultural Advisory Service headquarter in Kedainiai, Lithuania.



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## Knowledge Sharing

### Controlled drainage – a rediscovered approach for water management

By Carina Heinrich, BalticCOMPASS, Germany

*State Agency for Agriculture, Environment and Rural Areas Schleswig-Holstein's (LLUR) contribution to the BalticCOMPASS project is a bottom-up communication concept trying to integrate local people in the solution process of nutrient problems. By making use of the knowledge in the region, the need for improved drainage management emerge; a local farmer observed stressed crops due to summer droughts while drainage water still flowed out of the drainage outlet. The aim was to keep the water in the field to make it accessible for plants and at the same time reduce nutrient input in surface waters. With the help of the local farmers, two measures have been developed: algae ponds and controlled drainage. As it turned out, the idea of controlled drainage had already been developed some time ago, but had not been implemented.*

In the Baltic Sea catchment, 71% of the overall nitrogen input in surface waters stem from diffuse sources, whereas 80% of this diffuse input stem from agricultural areas (Helcom



Model region in Schleswig-Holstein

2009). This fact shows a need to search for new solutions concerning the reduction of nutrient input into surface waters.

The measure for controlled drainage grew out of a farmer's idea on how to deal with summer droughts. His idea was to regulate the water in the field by closing a drainage pipe, so that the plants would get enough water for growing. Another benefit from outflow reduction is reduced nutrient leaching and thus smaller nutrient input in surface waters. This win-win measure for the farmer and the environment is a pilot measure to be implemented in Schleswig-Holstein by the BalticCompass project.

A survey concerning the measure controlled drainage and a communication through a network of scientists and experts resulted in an interesting discovery: intensive research concerning drainage management had been practised in the former German Democratic Republic (GDR), but in 1989 the activities stopped and got lost due to the fall of the Wall in 1989.

In the late 80's there was even a guideline prepared which provided detailed information and regulations concerning controlled drainage. The guideline dealt for example with principles, conditions for application and information on water storage elements. The guideline came with ten TGL-standards – after “Technische Normen, Gütevorschriften und Lieferbedingungen” (TGL) (*technical standards, quality specifications and delivery conditions*) – which had been published in official law journals. When implementing a new drainage system it had been obligatory to check if special conditions were given according to the guideline. If so, a drain stop had to be implemented in the drainage system.

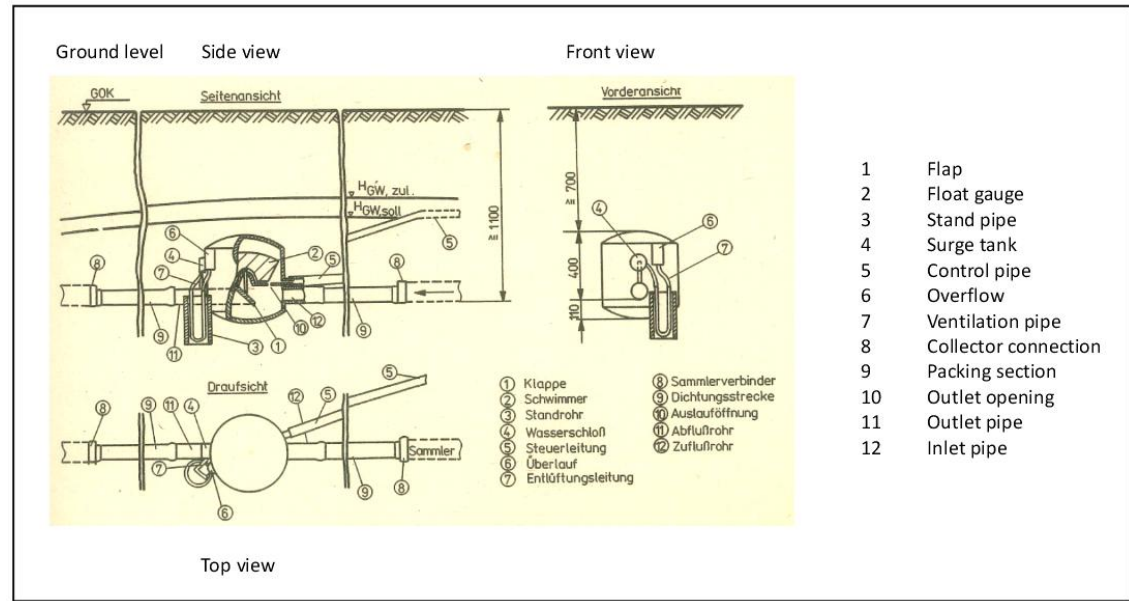
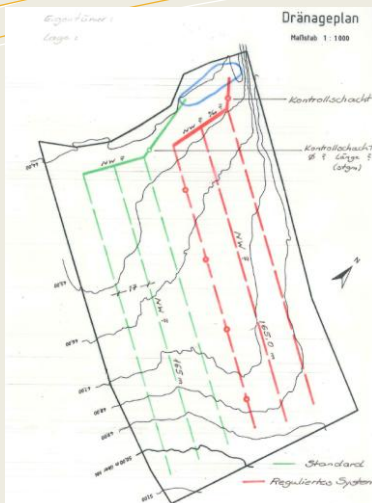


Figure 1: Storage drain – layout scheme (Source: TGL 42812, p. 8)

Until recently, drainage management has been a fairly unpopular research field in Germany. However, due to the Water Framework Directive (WFD) goals and high diffuse nutrient input caused by agriculture, the topic is gaining more attention. According to WFD, existing measures have not been sufficient in bringing all water bodies to a good status, so development and implementation of new measures is needed.

Several institutes, especially in eastern Germany, are doing research in controlled drainage. The Leibniz Centre for Agricultural Landscape Research (ZALF) and the State Agency for Environment, Nature Protection and Geology Mecklenburg-Vorpommern (LUNG) have adopted the old TGL-standards within their research. In addition to supporting denitrification by regulating the water level, it is also a goal to tackle climate



Drainage plan for pilot farm.

change. Regulating devices according to the TGL-standards will also be constructed and implemented within BalticCompass.



Figure 2: Drainage regulation device (Source: Dr. Jörg Steidl, Leibniz Centre for Agricultural Landscape Research (ZALF), Institute of Landscape Hydrology)

What brought this earlier discovery back to the light was the communication concept where local people are involved in a participatory way. Direct contact with local people in meetings, other means of communication as well as a trans-regional network helped to collect information about regional problems and ideas for solutions.

Local people are the ones who know best about regional ecological aspects as e.g. weather conditions, water household, soil fertility etc. and even influencing factors to problem solution. The farmers were thus asked to share their knowledge about their region and the relevant aspects, and by doing this enabling them to produce ideas about possible solutions for the problem addressed. The goal of this concept is to change farmers' position from being a group that is controlled to a group who is actively involved with planning and thus managing themselves.

The TGL-guidelines have been translated to English and can be fully downloaded in German and English on the BalticCompass website: [www.balticcompass.org](http://www.balticcompass.org)

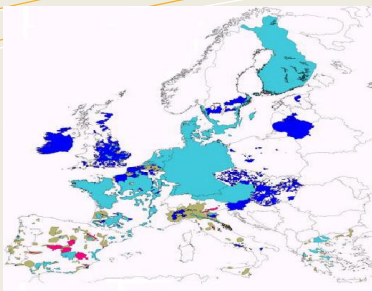
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Designated Nitrate Vulnerable Zones (NVZ's) in EU



From Danish biogas plant: Morsø Bioenergy.

## Science

# Effects of anaerobic digestion of manures (biogas production) on leaching of nitrogen after land application

By Peter Sørensen, Department of Agroecology, Aarhus University, Denmark.  
E-mail: [Peter.sorensen@agrsci.dk](mailto:Peter.sorensen@agrsci.dk)

## Nitrogen leaching from livestock manure

In the long run there is a greater leaching after application of organic N than from mineral N (when manure is applied in spring). This is due to the fact that the mineral N is directly available for the plants, while the organic N needs to be mineralised before it is available to plants. As the mineralisation also takes place in periods without plant growth in the autumn/winter period, the plant utilisation of the mineralised N is poorer and the leaching greater. The release of the organic N takes place over a long period of years of up to 100-200 years after manure application. This means that a part of the extra leaching from the organic N does not happen within the first year, but in the long term. As an overall rule of thumb, we assume that about 30 per cent of the mineral N and 45 per cent of the organic N are leached (during a period of 200 years) in grain-rich cropping systems under Danish conditions. The leaching is both affected by the type of soil and climatic conditions. Most of the leaching of mineral N takes place within the first couple of years after the application, while the main part of the organic N is leached in the longer term. During a shorter period of 1-5 years, the leaching is about proportional with the total N application rate (mineral + organic N), as long as the application of plant available N is around the economic optimum of the crop or lower (Thomsen et al, 1997; Sørensen and Birkmose, 2002).

## Effects of anaerobic digestion

By anaerobic digestion of livestock manure, a conversion of organic bound nitrogen into mineral N takes place and easily decomposable carbon in the manure is reduced. This means that the plant availability of N in manure increases typically 10-20 percentage point in the year of application, if the N losses are kept unchanged (Sørensen and Møller, 2009; Sørensen et al., 2011). On the other hand there is a lower residual effect in the years after the application (Schröder et al, 2007). Digestion of organic manure with a greater part of organic N, such as for example solid manures, solid fractions from slurry separation and plant materials leads to a greater increase in plant availability. Seen over a 10 year time horizon, it can be expected that it is possible to achieve a N utilisation of at least 80 per cent for mixed biogas manures corresponding to an increase in N utilization of about 10 percentage points (Petersen and Sørensen, 2008).

*The leaching effect by unchanged N application after digestion:* in the short term (5-10 years) leaching can be expected to be unchanged), as an unchanged application of total N takes place. However, in a simple model calculation we have calculated that in the longer term (100-200 years), a reduction in leaching of 2.3 kg N/ha is expected after digestion of pig slurry.

*The leaching effect by an adapted N application rate after manure digestion according to the higher N availability:* In the short term (5-10 years), a lower N leaching must be expected as the application rate of total N is reduced. Model calculations at in the FASSET model (Aarhus University) shows that digestion of pig slurry and a simultaneous reduction in application rate of manure of 9 kg N/100 kg manure N leads to a reduction in the N leaching of 2.1 kg N seen over a 50 year time horizon (Schou et al. 2007). Over a period of 100-200 years, the effect is expected to be around the double. With regard to other

manure types greater effects can be expected on N leaching, however, we have presently no estimations of such effects.

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Cultivation of algae in open ponds. Source:

<http://www.greencenter.dk>

## Report: List of measures for the pilot region Schleswig-Holstein

Carina Heinrich from the State Agency of Agriculture, Environment and Rural Areas of the German Federal State Schleswig-Holstein (LLUR) has, as part of the implementation of BalticCOMPASS, prepared a technical report that present pilot measures to face the problem of eutrophication of the Baltic Sea caused by agricultural nutrient releases.

The identified measures aims at reduction of diffuse input caused by agriculture, and comprise

- Drainage management (for instance the controlled drainage concept, as presented above).
- Cultivation of algae in open ponds
- Nutrient-controlled spreading of slurry
- Usage of nitrification inhibitor
- Precision farming

The report is available from [http://agro-technology-atlas.eu/docs/WP4\\_report\\_list\\_of\\_measures.pdf](http://agro-technology-atlas.eu/docs/WP4_report_list_of_measures.pdf)

### Belarus builds up on biogas production

*By Nikolay Kapustin, RUE SPCNAS (The Republican Unitary Enterprise "The Scientific and Practical Centre of National Academy)*

The government of Belarus pays great attention to the development of local and renewable energy resources, which in the same time can resolve problems related with biosecurity and environmental safety.

In Belarus there are operated about 100 cattle breeding complexes with animal population above 3000 cattle heads, 105 pig farms with pig population above 20 000 heads, 43 poultry farms with chicken population above 500,000. The implementation of biogas plants on these complexes will enable to solve both energetic and ecological problems.

In Belarus there exists the regulation of Council of Ministers from 9 June 2010 №885 "About program assertion of the construction of energy plants operated on biogas, for the period 2010-2012" with amendments affirmed by Government, from 30 November 2011 №1622, which concern the prolongation of the Regulation till 2015. In accordance with these documents, in Belarus by 2015 there should be constructed 38 biogas energetic complexes with a total power of 37.9 Megawatt.

To realize the Program it is planned to use the following financial sources:

- Private asserts of a customer (13.6%);
- Bank credits (5.5%);
- Foreign investments (76.5%);
- Republican budget (1%);
- Innovation funds (0.6%);
- Local funds of nature protection (2.7%).

For example, one European biogas company realizes in the agricultural sector of Belarus three construction projects of biogas plants with total power of 5.4 MW. The size of foreign investments is in this case M€ 24.

To attract direct foreign investments to Belarus there has been created a fruitful investment climate that is reflected in the following legislative documents:

1. Investment code of the Republic of Belarus, from 22 June 2001 №37-3.
2. President's Decree, from 6 August 2009 №10, "About creation of extra conditions for investment activity in Belarus" (with amendments, in accordance with President's Decree, from 6 June 2011 № 4).
3. Regulation of Council of Ministers, from 6 August 2011 №1058, "About realization measures of President's Decree, from 6 June 2011№ 4"

Besides, in the Republic of Belarus there was asserted the "National Program of development of local and renewable energy resources for the period 2011-2015" by the Council of Ministers, from 6 June №586. In accordance with this Program in 2015 the total power of biogas plants in Belarus should be 90 Megawatt by means of additional implementation of:

- In agricultural sector - 32 biogas plants with total power 18.6 Megawatt.
- In housing sector - on treatment plants – 19 biogas plants with total power 19 Megawatt, and 7 plants on waste disposal areas with total power 3.4 Megawatt.
- In food industry (on sugar mills) – 4 biogas plants with total power 12 Megawatt.







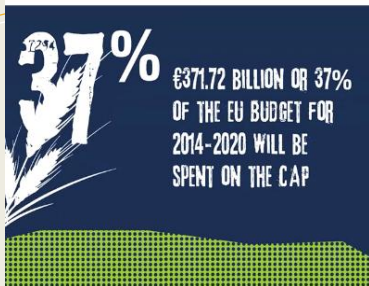
In accordance with implementation of the Program, the situation is the following:

1. In Belarus the project period for biogas plants lasts 3-4 months (including the receipt of expert's report for construction project – 6 months);
2. Scale of projects – biogas plants with power from 0.3 to 2 Megawatt.
3. The customers will be agricultural complexes, corporations, enterprises of private property that are interested in attracting external investments in addition to private budget.
4. All biogas projects realized in Belarus should have practical commercial character.
5. All biogas projects realized in Belarus should have an innovative character.
6. All biogas projects belong to ecological technologies and they are supported (with partial financing) by Ministry of Nature Resources and Nature Protection of Belarus.
7. The potential of technologically possible and economically efficient market is estimated to 700-1000 biogas plants with total power 650 Megawatt. But a complete realization of this plan in the next 10 years is not practically possible because of difficult economic state of agricultural entities in Belarus.

At present Belarus lacks a sufficient experience of designing and production of equipment for biogas plants. That is why market competition is defined by European producers that take part in tenders to realize such projects.

8. Cooperation investing is possible, for instance, by means of creation of joint ventures.





Screenshots from an [animation](#) shown on the conference

## Impressions from international conference

### Dialog building on Common Agriculture Policy

By Zanda Kruklite, Latvian Farmers Parliament

The European Environmental Bureau (EEB) and BirdLife Europe with assistance of Danish environmental institutions organized Conference in Copenhagen „The new CAP: The right path to sustainable farming?“ Discussions were focused on the new Common Agriculture Policy proposal presented at the October, 2011. Organizers invited wide range of the stakeholders as speakers and also participants, with the aim to represent opinions of all involved parties. Opening speech of the Danish Minister of Agriculture and Food, Mette Gjerskov, who represents also the EU presidency, indicated four main priorities in the CAP further development process:

- Environmental situation and regional characteristics differs in all Europe. Therefore, greening should be regionalized according to the national and local needs, and there should not be similar approach and requirements for all Europe countries introduced.
- Possibility to reallocate 10% from Pillar I to Pillar II would be good solution to allow higher elasticity for countries to use finances in the most efficient way.
- New policy implementation mechanism should be simplified and more interesting agro-environmental measures must be developed for farmers. Greening measures should be attractive and at the same time voluntary for farmers, and implemented according to the long term agreements.
- Promotion of innovations, technologies of tomorrow. There are possibilities to use more resources available at rural areas in diverse ways. Therefore, possibilities to introduce new income sources for rural areas must be exploited.

In five panel discussions current experience in environmentally friendly farming, innovation and policies development was presented by farmers, politicians, NGO representatives and officials. Neither party expressed strong support to current version of the CAP document, however all recognized, that the main task for everybody is to forge ahead from the confrontation to the dialog path. By most of participants need to shift actions towards more sustainable and innovative practices was recognized as precondition for Europe long-term food security and sustainable farming.

It is widely recognized that there is no funds which will be used just to keep people living at country side. There should be economical activities developed and all supported people should generate value. However, economical activities need wise perspective with long term vision based on sustainable production principles. Technologies of today and tomorrow offer possibilities to change from intensive to intelligent farming and to be profitable at the same time. In conference it was clearly presented by examples from UK grasslands farmer Tom Malleson, Danish farmer Kim Kjaer Knudsen, Karel Bolckmans from Koppert biological systems and others, that shift toward more environmentally responsible and economically efficient farming is possible and already rising. The new CAP needs further development by officials, to become powerful support resulting in long-term benefits for our environment, farmers and society.

More information at: <http://www.birdlife.org/community/2012/03/urgent-message-from-denmark-cap-must-support-sustainable-farming/>. All the presentations as well as the pictures of the day are found here: <http://www.eeb.org/index.cfm/news-events/?displayTab=events>.





Impressions from conference in Copenhagen on 29 February, jointly organised by DANETV, VERA/Danish Environmental Protection Agency, and EU ETV

## Launch of EU ETV: System for international recognised Environmental Technology Verification under development

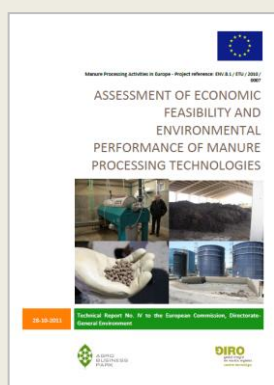
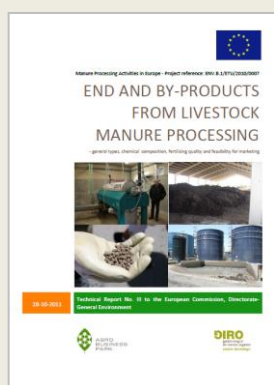
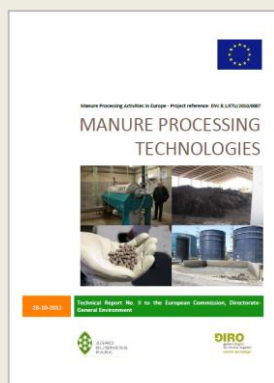
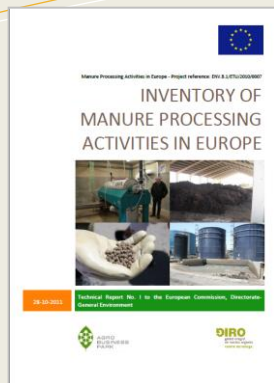
*By Henning Lyngsø Foged, WP4 leader of Baltic COMPASS*

Verification of environmental technology is very costly and quite time consuming. Typically such verification costs 50-90,000 € and takes 1½ year. Technology verification is necessary for customers' confidence as well as for acknowledgement as a Best Available Technique (BAT) in relation to EU's legislation about environmental permitting of installations for rearing of intensive livestock. A survey has revealed that only 11% of buyers trust the technology providers own information, while almost 2/3 of customers asks for validated and impartial descriptions and documentation of effects and operational costs etc.

The drawback, as the situation is today, is that the verification alone is acknowledged in the EU member state where it is done, wherefore technology providers in especially small EU member states are forced to invest in verification in several countries. Particularly the SME's among the technology providers have difficulties to afford such investments, which after all are rather risky because they come before a wider market introduction.

In Denmark the situation is that 5 technological institutes have formed a consortium, DANETV, which tests and certifies environmental technologies, performing testing under their own protocols. In order to establish a certification system that are acknowledged by more countries, the Danish Environmental Protection Agency has together with partner authorities in Germany and the Netherlands established the VERA certification, so that in principal a technology that are verified in the Netherlands is officially acknowledged in the other two countries. Now EU launches the EU ETV pilot project, and it is the belief that EU ETV will link national and regional initiatives. The goal with the EU ETV system is that it will be possible to obtain EU ETV verification for a price of only € 20,000, and that such verification will be officially acknowledged in all EU member states. However, agro-environmental technologies are not a part of the EU ETV pilot project, but may be included in the longer run. The ultimate goal is to have a worldwide, official recognized "ISO ETV" certification within the frames of the World Trade Organisation.

Presentations from the conference (mainly in Danish) are found here - [http://www.etv-danmark.dk/filer/nyheder/MST\\_ETV\\_konference.pdf](http://www.etv-danmark.dk/filer/nyheder/MST_ETV_konference.pdf).



Project that was initiated by DG ENV of the European Commission is now finalised and five technical reports are available

## Catching up on “Manure processing activities in Europe”

*By Henning Lyngsø Foged, WP4 leader of Baltic COMPASS*

Agro Business Park has in cooperation with GIRO Centre Tecnològic finalised a DG ENV financed study on “Manure processing activities in Europe”. The study has established an inventory of manure processing, described the state of the art of processing technologies, classified end and by-products and their feasibility for marketing, assessed the economic and environmental feasibility of different technologies via seven case studies, and considered future trends for manure processing.

The reports contain some unique information and conclusions about manure processing, for instance:

- An inventory of manure processing activities, which determines, that manure processing currently has reached an average level of 7.8% of the livestock manure production, with a big variation from country to country.
- 45 unitary processes have been identified and explained. Some of these processes can be found working alone if these are enough for solving the problem that motivated its adoption. Others must be combined for fitting a given objective. Usual combinations have been identified at every unitary process description section and a synthesis of these main combinations is presented. Anaerobic digestion is found to be a key process in strategies dealing with nutrients recovery.
- There are presently especially three types of manure processing products being marketed at considerable volume, and a few more could gain importance if the interest in manure processing continues to grow. However, the market is suffering under lack of infrastructure, discredited qualities of the products, and lack of transparent and acknowledged regulation.
- There is a huge variation in economic and environmental performance of livestock manure processing plants, and that the individual farmer or the individual plant chooses the most feasible and cheap technology configuration for processing of livestock manure, depending on the surplus of nitrogen in the area, combined with regional framework conditions and other matters of importance for decision making.
- Locally based biogas production (anaerobic digestion of livestock manure) is a focal technology in the future because it aims at better recycling nutrients while at the same time it has other benefits, such as production of renewable energy. Product standards should be introduced as a way to support the development of the market infrastructure for end and by-products. A number of knowledge gaps require that additional research is carried out.

All five technical reports are now available for download from <http://agro-technology-atlas.eu/knowledge.aspx>.

## Upcoming events

### KTBL-Tage 2012 - Management der Ressource Wasser

Venue: Congress Centrum Hannover

Date: 21-22-03-2012

The event: Der Umgang mit einem Überschuss oder Mangel an Wasser steht im Mittelpunkt der KTBL-Tage 2012, die am 21. und 22. März 2012 in Hannover stattfinden. In den 16 Vorträgen werden ausgehend von den Herausforderungen, die sich aus dem Klimawandel für den Pflanzenbau ergeben, zukunftsorientierte Lösungsansätze vorgestellt. Es werden sowohl Wege betrachtet, die sich in der Vergangenheit oder in anderen Ländern bewährt haben, als auch neue Entwicklungen in den Bereichen Pflanzenzüchtung, Bodenbearbeitung, Bestandesführung, Bewässerungs- und Drainagetechnik sowie Bodenschutz betrachtet.

More info: [http://www.ktbl.de/index.php?id=234&tx\\_seminars\\_pi1\[showUid\]=48](http://www.ktbl.de/index.php?id=234&tx_seminars_pi1[showUid]=48)

### POLAND CLOSER - Get first-hand knowledge

Venue: UM Eigtveds Pakhus / Copenhagen

Date: 17 April 2012

The event: The main topic of the meeting shall be "Renewable energy and municipal waste management in Poland - legislative changes as an opportunity for foreign investors".

The purpose of the meeting will be to discuss business opportunities in the most dynamically developing sectors of the Polish economy:

- renewable energy,
- municipal waste,
- management and energy efficiency.

The background - Legislative changes in Poland initiated in 2011 - in both energy and environment sectors:

- 11.08.2011 - The Energy Efficiency Act enforced
- 22.12.2011 - A package of three bills announced;

their aim is to comprehensively regulate the energy sector and significantly change the legal framework, esp. the RES Act.

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## Colophon

This electronic newsletter is sent out quarterly from <http://agro-technology-atlas.eu> with the purpose to support innovation and investments within agro-environmental technology in the Baltic Sea Region by publishing relevant knowledge about the field to the Baltic Compass Network.

To read more about the project please go to:

<http://www.balticcompass.org>

We encourage everyone to contribute with content to this newsletter by contacting the editors.

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# BALTIC COMPASS

by leader of Work Package 4, Agro Business Park A/S



with co-funding from the Baltic Sea Region Programme



### 4th Nordic Biogas Conference

Venue: Bella Center in Copenhagen

Date: 23-25 April 2012

The event: Participate in the conference to exchange best practice on production, distribution and utilization of biogas.

Use the event to establish cooperation and commercial contacts with the expected 500 attendees and 60 exhibitors.

More info: <http://www.sgc.se/nbc2012/>

### Nährstoffmanagement dränerter, landwirtschaftlich genutzter Flächen

Venue: Bildungszentrum für Natur, Umwelt und ländliche Räume, Hamburger Chaussee 25, Flintbek

Date: 25-04-2012

The event: Aktuelle Angaben zur Verbreitung dränerter Flächen sowie Möglichkeiten zur Vermeidung und Verringerung von Nährstoffausträgen dränerter Flächen.

More info: [http://www.schleswig-holstein.de/AFNU/DE/Service/VeranstaltungenTermine/veranstaltungenTermine\\_node.html?link=/umwelt/link\\_veranstaltungen\\_7\\_238387\\_1\\_detail.html&typ=socket&cal\\_monat\\_jahr=4\\_2012&cal\\_monat=4&cal\\_jahr=2012&ter\\_subaction\\_send=auswahl](http://www.schleswig-holstein.de/AFNU/DE/Service/VeranstaltungenTermine/veranstaltungenTermine_node.html?link=/umwelt/link_veranstaltungen_7_238387_1_detail.html&typ=socket&cal_monat_jahr=4_2012&cal_monat=4&cal_jahr=2012&ter_subaction_send=auswahl)